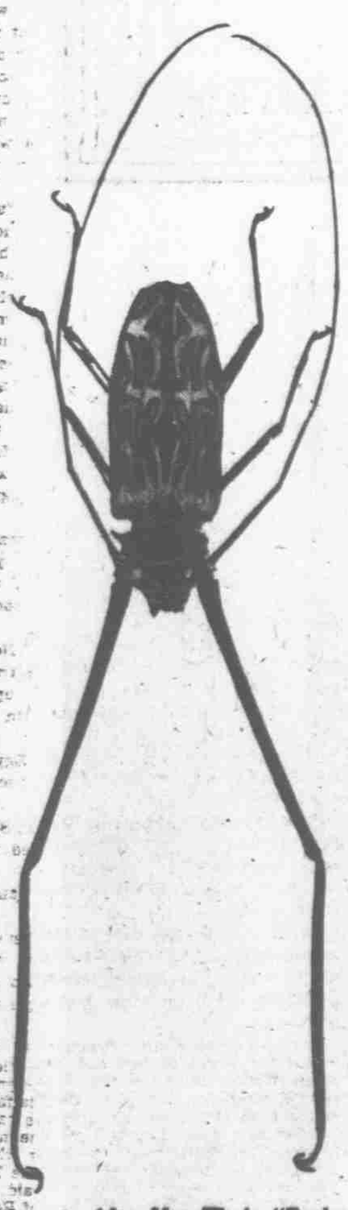
Science Finds Out Why Cats Have Whiskers

Why the Squirrel Shakes His Tail Over His Head, Why Bugs Have Long "Feelers" and Why Primitive Man Had Shaggy Eyebrows



Insects Also Use Their "Feelers" as Aids to Eyesight and This Harlequin Beetle Is One of the Most Interesting Illustrations of This Theory.

ALL-SEEING science has at last furnished a full and very interesting answer to the puzzling old question why cats have whiskers.

Everybody knows, of course, that the most familiar of domestic animals is supplied by nature with a remarkable growth of long, heavy hairs, popularly known as "whiskers," near the mouth, and a smaller growth of smaller hairs over the eyes. Science calls them "vibrissae." The cat takes great care of these hairs throughout life and they are extremely sensitive to the touch. Evidently they serve some important purpose.

Naturalists have long discussed the purpose of these appendages. The great Darwin gave publicity to the theory that they help the cat to feel its way through the bushes and avoid making noises that would alarm its prey. Many persons think that they exist in order that the cat may measure whether it can pass through an opening before it.

Now science has shown by a long series of careful experiments that the "whiskers" really help the cat to fix its eyes upon an object on which it has to concentrate its attention for a long time, such as a mouse's nose. Without these appendages the object would disappear occasionally through fatigue of the eyes and the cat would lose its prey.

This discovery is the work of Professor P. F. Swindle, the distinguished experimental psychologist, and is described by him in the American Journal of Psychology.

Other animals besides the cat have whiskers and other appendages for helping their eyes to "fixate" objects. Man's eyelashes serve the same purpose to some extent, and in past ages, when he had to catch his food through quick sight, he was more liberally supplied with such aids, including long, shaggy eyebrows.

The scientist observed certain preliminary facts. He noted that animals of the cat family—including lions and tigers—that hunt for their prey and have to fix their gaze rigidly have larger whiskers than any other animals. He noted that while the watching cat kept very still, its whiskers moved continually. He noted that the cat animals, which are nocturnal, usually have white whiskers, and that other animals, which are day roamers, such as squirrels, usually have dark whiskers or mixed whiskers.

He considered the well-known habits of these animals in connection with certain laws of optics, of which he had made a special study. He knew that an object disappears temporarily when looked at too fixedly, and that it is brought back to clear view more quickly if the vision be temporarily interrupted. These things pointed strongly to the conclusion that the whiskers were appendages to the eyesight, enabling the owners to fixate victims, boughs of trees and other objects, and he proved this conclusion by careful experiments.

He watched a cat who was a splendid mouser. Then he cut off the animal's whiskers and found that it could catch no mice. Finally he fitted false whiskers to the animal, and it immediately regained its mouse-catching abilities. The professor's account of this experiment is of absorbing interest.

"When a cat hears a noise in a pile of boards it sits quietly near the boards and keeps its eyes turned in the direction of the noise until the mouse makes its appearance; then the cat usually pounces on to it with one or both paws," writes the professor. "If now a mouse comes to the end of a board and exposes only the nose, as mice generally do before scampering out into the open, the cat springs and captures it from behind the board with one paw, which it can very expertly bend in a sharp angle to fit around the board.

"If the cat has no whiskers or eyelashes, which it can continually move about in its field of vision as it fixates, it should, theoretically, be often unable to see the nose, because the nose, which is really a small point, must disappear at moments. The cat must, accordingly, wait until the mouse shows a larger part of its body or comes entirely from behind the board and skips about.

"But mice very often show only the nose and turn back. The whiskerless cat would lose these opportunities, which are really good ones for a whiskered cat, and must necessarily live upon mice that venture into the open. Moreover, if a cat fixated an object which disappeared and reappeared it would grow restless and frighten the mice.

"For many days I observed a cat while it was watching for mice. It evidently lived on mice and rats, for nobody fed it. During one afternoon I saw it catch two mice, and at dusk I found it with a rat. I deprived the cat of its whiskers, and again observed it as it watched for mice. I saw it spring several times into the shucks and hay, but it captured no mouse while I was present. It may, of course, be that I could not so well detect the presence of a mouse as even the whiskerless cat could, but it often seemed to me that the cat sprang when no mouse was about. I supposed that some of the objects which were in the cat's field of vision as it fixated, disappeared, and that when the animal moved its head or partly closed one or the other or both eyes, as it occasionally did, an object that had vanished suddenly reappeared and was mistaken for a mouse, perhaps not for the entire body, but for such a small part as the nose.

"The cat grew weak; each time it saw me it ran to me, rubbed for a while against my legs, and quite often looked me in the face and meowed. As a whiskered cat it never did this. Instead of feeding it I glued some rabbit whiskers at various places on its face, as much as possible onto the old whisker stubs. These would move about somewhat as the original whiskers did. For the sake of economy I tried to give the cat movable whiskers; for a single whisker that moves in the field of vision is certainly worth a number of stationary ones.

"As long as the false whiskers were intact, the cat behaved just as it originally did; I never observed it spring without catching a mouse. But every time the animal washed its face the rabbit whiskers would be either badly displaced or scraped entirely away. Since this method caused so much trouble, I shot some horned owls and glued many long shaky pieces of feather down before and behind the cat's eyes. Especially when the ends of these were charged with electricity, which I generated on the cat's back and transferred to the ends of the feathers, they stood out on the face and waved back and forth in a way resembling the movements of the round arms of a sea anemone. When the cat now washed its face the down was usually left intact, and all I had to do was to occasionally straighten and recharge the pieces

"I convinced myself that when the cat had false whiskers, it was a much more efficient mouser than when it had none. I saw it catch more mice, and it seemed to get somewhat fatter; but it still remained hungry only for the simple reason that I could not all the while be with it to replace the down it lost, to straighten the pieces that became tangled with the hair, and to keep the ends charged."

The professor apparently had some difficulty during these experiments in getting hold of cats of the more prosperous class. These animals are notoriously cunning, and some people believe that they have a way of signalling to one another concerning places and persons to be avoided. The professor hunted around and found a cat that had been deserted by its owners and had lived by hunting birds, mice and wild animals in the woods and fields, as some cats will.

The professor shingled this poor cat's whiskers and eyelashes and set it free. For many days it roamed about as usual, but after about two weeks he often saw it near an old house where it formerly lived. Strange to say, the cat would not let the professor come near it, but he supposes that without its whiskers it was unable to catch its prey in the woods and that it came back to its former home in the hope of getting something to eat.

In discussing the optical principles of the experiments the professor points out that if one fixates with his eyes a small piece of green paper on a larger gray background, the color of the paper and the color of the background become merged to such an extent that all becomes one solid area of green, one can at times distinguish no transition from the paper to the background. However, if at this stage one lowers the eyelashes the area of the colored paper becomes at once distinct, even though the color now observed is antagonistic to the previous one—that is, red.

Fixation of an object, or perception of color, cannot function indefinitely because the nervous structure of the eyes involved becomes exhausted. In the case of colors the eye upon exhaustion only responds to the antagonistic color. The whiskers are an apparatus for interrupting vision before exhaustion and thus preserving normal vision a great length of time. The watching cat's whiskers are always moving, always furnishing points of relief.

The object fixated by the cat's eyes may change in color, but a blue mouse would evidently look better than none to a cat.

The professor finds that the squirrel's whiskers generally serve the purpose of enabling the animal to fix with its eyes a branch on which it wishes to spring from another. If the objective branch were to disappear the squirrel might spring and fall to the ground.

The professor caught such squirrels, ravished them of their whiskers and occasionally set one free. The whiskerless squirrels would look at the branch of the tree on which they wished to jump, then turn away, and run backward and forward several times before venturing to jump. He never observed this behavior with whiskered squirrels.

Every one who has given attention to squirrels knows how they jerk the bushy tail when they walk slowly or come to a standstill. The moving tail falls in the animal's field of vision. The professor sheared the tail of a whiskerless squirrel and set it free. Several times the animal missed its aim when jumping and fell to the ground.

Even the eyebrows of human beings, though they lie only in the upper field of vision, serve the same purpose. This is especially true of the American Indian and must have been so of the prehistoric man with his shaggy overhanging brows. When the Indian frowns, as is the case when a distant object is being carefully observed, the eyebrows fall and project a short distance into the field of vision just over the eyes; and careful observation shows that they are usually in a perfect tremor.

The rabbit needs no whiskers while running, for it does not move steadily over the earth, but leaps and bounds, thus giving relief to its eyes. As the animal lies roughly entrenched during the day in open fields and with its head motionless and close to the ground it needs black whiskers, which project between the eyes and the sky, or, in other words, between its eyes and its daytime enemies. These whiskers are always moving.

The rabbit would need no whiskers in the night time if it never stopped running, but since it does stop and sit on its haunches, it really does need some. Furthermore, since it runs mostly in the evening and at night it needs some white and some black whiskers. A white whisker on a dark background is more effective than a black whisker would be.

When the rabbit is in the sitting posture its head is quite differently inclined than while it is running or lying. The nose is now considerably higher than the eyes and consequently owing to this position of the head the white ends of some long half black and half white whiskers, which are rooted so low down under the nose that they serve the animal no purpose as it lies in its bed, fall between the eyes and the dark objects on the earth.

It is interesting to note that the outer or white ends of the rabbit's whiskers fall between the eyes and the more distant objects while the inner or black ends obstruct the vision for closer objects. Thus the black diurnal whiskers are converted into nocturnal ones by being thrown between the eyes and the horizon, and the white or nocturnal whiskers, which were of no use to the animal during the day, lie in the most useful position at night. The rabbit's long ears also serve the purpose of reflecting and assisting vision.

The professor, by the way, does not explain why black cats have black whiskers and gray cats gray whiskers.

The opossum, he tells us, sleeps during the day in secluded places, usually in tree cavities or in deserted nests of other arboreal animals. In the night time it walks or trots steadily over the earth. It therefore has two sets of whiskers, some white ones which fall between the eyes and the dark objects it moves over, and some black ones which lie between the eyes and the higher objects which are surrounded by the light sky.

Birds, like owls, which are clever at catching live prey usually have whiskers.

Gregarious birds, such as partridges, usually have no whiskers or feathers taking their place, because with their companions fluttering about them they are not needed to assist the vision.

Some whiskerless birds, such as ducks, nod the head quite frequently, presumably to relieve eyestrain.

Insects, which have compound eyes, usually possess prominent antennae, which continually move before the eyes. Anybody who has watched a cockroach standing on the edge of the sugar-bowl and waving its "feelers" about can confirm this statement. The harlequin beetle, which has four enormous antennae longer than its body, appears to have a very complicated method of interrupting vision in order to assist the vision.

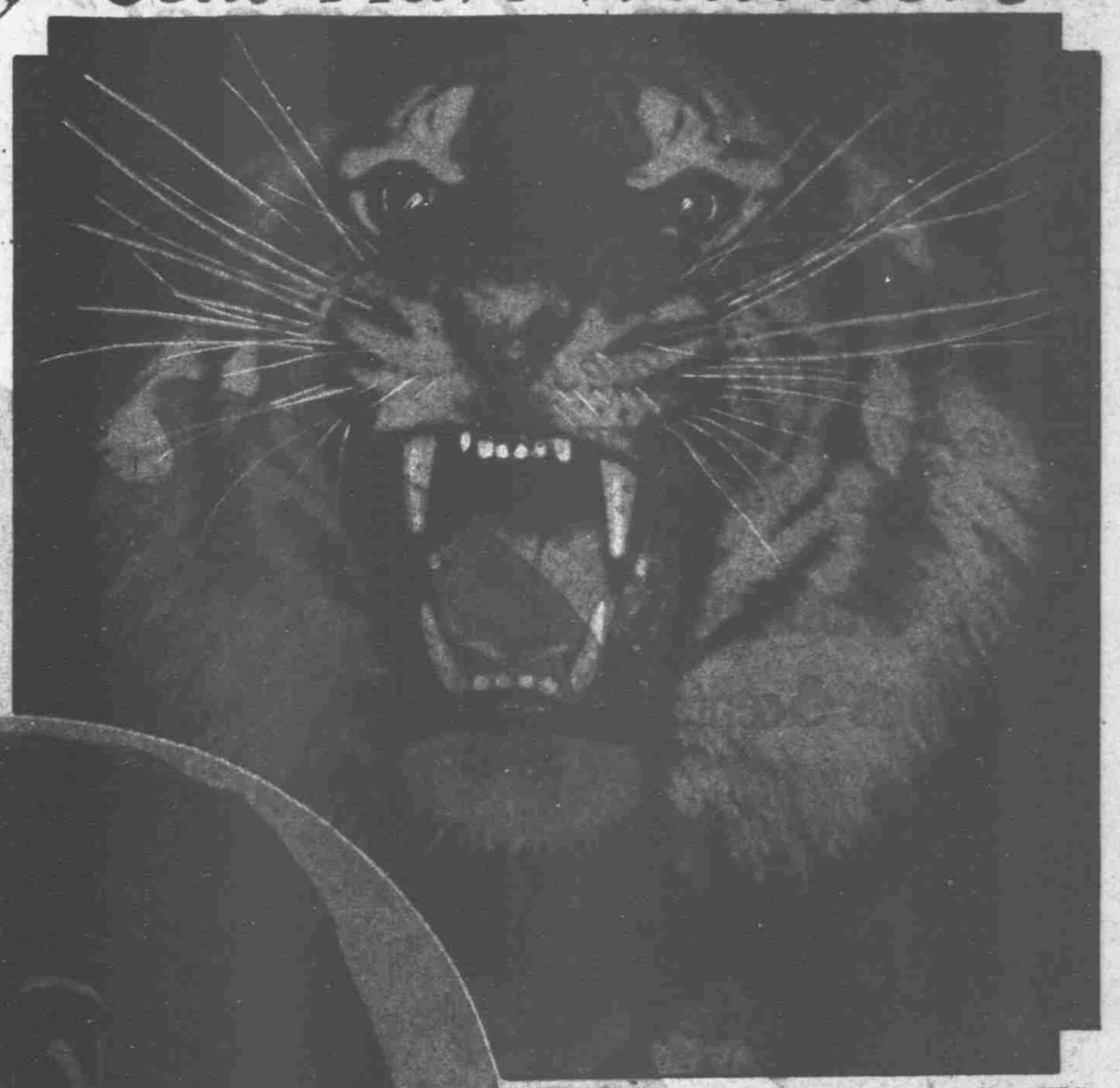
Those invertebrates, such as spiders, which have the insect type of eyes, but no antennae, often raise the body spasmodically or else move it from side to side.

Creeping animals, including the snakes, often thrust the tongue out of the mouth and between the eyes and objects looked at.

Many reptiles lie quiet for long periods of time, and then raise and lower the body or nod the head spasmodically. This has been noticed in many of the lizards.

Some aquatic animals, including the salamanders, which have no eye appendages, rock the body by lifting first one side and then the other.

Even the least pertinent of these facts support the theory that an animal in order to use its eyes efficiently must either have whiskers to relieve the strain or shift the body or achieve the same purpose in some other way.



The Tiger and Most of the Cat Animals Have White Whiskers, Says the Professor, Which Help Them to Fix Their Gaze on Their Prey at Night, as Otherwise Their Eyes Would Lose Sight of Their Object Through the Fatigue of Concentration

Prehistoric Man Had Shaggy Eyebrows, Which Together with His Eyelashes Helped Him to Concentrate His Gaze on Small Distant Objects—Food or Enemies

Kitty While Watching a Mouse Fixes Her Gaze with Wonderful Steadiness, but Her Whiskers Move Constantly. Without Them the Professor Asserts She Has Little Mouse-Catching Success.

The Rabbit, Science Finds, Has Black Whiskers to Help Its Vision When It Looks at the Sky annd White Ones for Looking at the Earth